

REMARKS

By the present amendment, claims 8-9 and 14 -20 are pending in the application.

Amendment To The Specification

The paragraph at page 23, line 36 to page 24, line 7 of the specification has been amended to more completely describe the structure illustrated in Fig. 12(a) of the drawings.

That is, the amendment to the paragraph at page 23, line 36 to page 24, line 7 is supported by Fig. 12(a) of the drawings. With respect to the lower split tee 4 of Fig. 12(a), the open space created by washer plates 24 (space keeping members) between the flange 5 of split tee 4 and the column 1b(1) is illustrated as extending across the entire width of the flange 5 in the region corresponding to the location where the web 6 of split tee 4 intersects flange 5 of split tee 4.

Amendments To Claims

The claims have been amended to reflect amendments discussed at the personal interview on April 2, 2008.

See Interview Summary (prepared by Examiner) in the portion starting "Substance of Interview...". See Statement of Substance of Interview filed by the applicants' attorney at Section D.

Minor amendments have been made to the claims to improve clarity.

Claims 8, 14 & 16

Independent claims 8, 14 and 16 have been amended to claim an open space across the entire width of the flange between the flange of the split tee and the steel column.

This amendment is supported by Fig. 12(a) of the drawings. See prior discussion of the amendment to the specification.

Claims 18, 19 & 20

Independent claims 18, 19 and 20 have been amended to claim that the thickness of the flange of the split tee is partially reduced across the entire width of the flange to provide the open space between the flange of the split tee and the steel column.

This amendment is supported by Fig.13(a) and 13(b) of the drawings (split tee 4, flange 5, web 6, partial reduction in thickness of flange 5 illustrated by 65). Fig. 13(b) clearly shows that the partial reduction 65 of the thickness of the flange 5 extends across the entire width of flange 5 at region where web 6 intersects flange 5.

§103

Claims 8, 14 and 16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 05-263469 to Furuumi in view of U.S. Patent No. 4,905,436 to Matsuo et al. and U.S. Patent No. 6,059,482 to Beauvoir.

Claims 9, 15 and 17 to 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 05-263469 to Furuumi et al. in view of U.S. Patent No. 4,905,436 to Matsuo et al. and U.S. Patent No. 6,059,482 to Beauvoir and further in view of U.S. Patent No. 6,754,992 to Byfield et al.

These rejections, as applied to the amended claims, are respectfully traversed.

The Present Invention

The essential point of the present invention is to provide a column and beam join structure capable of minimizing damage to the structure by plasticizing the flange of the split tee in advance of the column and beam so that the split tee absorbs the energy of an external force when an external force such as an earth quake or strong winds acts on the structure. The purpose of the present invention is avoiding an external force damaging the column and beam.

In the column-beam join structure of the present invention, the flange of a split tee is connected to the column by bolts and web of the split tee is connected to the flange of the beam by bolts.

In order to plasticize the split tee in advance of the column and beam, an open space is provided between the column and the flange of the split tee across the entire width of the flange by inserting space keeping members between the column and flange of the split tee or by partially reducing the thickness of the flange of the split tee across the entire width of the flange of the split tee.

The portion of the flange of the split tee facing the open space will plasticize in advance of the column and beam and absorb energy of an external force when the external force such as an earthquake or strong winds acts on the structure.

In the present invention, plastic deformation of the column and beam of the structure can be minimized and thus the structure is kept safe.

Patentability

Japan No. 05-263469 to Furuumi ("JP '469")

JP '469 relates to a column-beam joint structure and discloses a structure where an end plate welded to an upper flange and web of a beam is provided at the upper part of the beam made of a section steel. The end plate is joined to a column with bolts, and the lower flange of the beam is joined to the column with bolts via a split tee.

However, JP '469 does not disclose or suggest an open space provided between the column and the flange of the split tee across the entire width of the flange of the split tee.

Although the structure disclosed in JP '469 has a reinforcing member 2 between the column 1 and the flange of the split tee 5 or end plate 10 (e.g., Fig. 1), an open space is formed along the longitudinal direction of the column. An open space is not formed across the entire width of the flange of the split tee or end plate.

Therefore, this open space of JP '469 cannot act as an open space to plasticize the flange of the split tee prior to the column and beam being plasticized as in the present invention.

As explained above, since JP '469 does not disclose or suggest the open space provided between the column and the flange of the split tee across the entire width of the flange as in the present invention, the present invention is not disclosed or suggested by JP '469.

U.S. Patent No. 6,059,482 ("US '482") to Beauvoir.

US '482 relates to a bolted connector (split tee) for connecting beams and columns. The connector has a web having a partially reduced portion (thickness) and a flange having a tapered portion.

US '482 does not disclose an open space between a flange of a split tee and the column across the entire width of the flange of the split tee.

Therefore, US '482 does not disclose or suggest the technical feature of the present invention that the flange of the split tee is plasticized prior to the beam and the column being plasticized.

Although the cross-sectional area of the flange of the connector of US '482 is partially reduced, the flange is merely tapered and does not have a cross-sectional shape of the present invention promoting plasticization such as the present invention.

According to the present invention, in order to plasticize the flange of the split tee prior to the column and/or the beam, the cross-sectional area of the flange of the split tee, i.e., the thickness of the flange, is partially reduced across the entire width of the flange at least at a region corresponding to the extended direction of the web of the split tee.

Since the shape and the position where the partially reduced portion of the flange is provided in US '482 are different from those of the present invention, US '482 does not disclose or suggest the present invention.

U.S. Patent No. 4,905,436 to Matsuo ("US '436")

US '436 relates to a column and beam join structure and discloses a structure where the column 1 and the beam 2 are joined by a connector 3 using bolts.

As shown in Fig. 9 of US '436, reinforcing plates 9 are inserted between the flange of the connector and the flange of the column.

As described in column 4, line 46 to 50 of US '436, the reinforcing plates are welded to the surface of the flange of the column.

US '436 does not provide the open space between the flange of the column and the flange of the connector, which would serve as a deforming space for the flange of the split tee, as in the present invention, in the region corresponding to the extended direction of the web of the split tee of the present invention.

Therefore, these reinforcing plates of US '436 cannot have a function to plasticize the flange of the split tee prior to the column and the beam.

The reinforcing plates of US '436 are different from the space keeping members of the present invention and do not disclose or suggest the open space across the entire width of the flange of the split tee provided by the space keeping members of the present invention between the flange of the split tee and the column.

U.S. Patent No. 6,754,992 ("US '992") to Byfield et al. relates to a connector connecting column (1) and beam (2) and discloses a connector (3) having flange (4) and web (5) and each having plurality of slots (6) formed by an acute head (7) and a coextensive neck (8).

Further, as shown in Figs. 2, 3 and 7 of US '992, for example, a plurality of studs (11) having head (12) and shank (14) are fixed on the web or flange of the column and on the web of the beam by welding or bolting.

The acute head (7) of the slot (6) of the connector (3) of US '992 is inserted into the head (12) of the stud (11) fixed on the web of the column (1) and beam (2), and then is moved so that the shank (14) of the stud (11) is positioned at the neck (8) of the slot (6), and as a result the web or flange of the connector is engaged with the shank of the stud fixed on the flange or web of the column and on the web of the beam.

That is, the column and beam of the structure of US '992 are connected by engaging the neck (8) of the connector (3) with the shank of the stud on the column and beam.

As explained above, in the present invention, the web of the split tee is connected to the flange of the beam by bolting, while in US '992, as shown in Figs. 1, 2, 8-10, 12-13, 25, 27 and 28, the web of the connector (split tee) is connected to the web of the beam by engaging with studs and not by bolting.

Therefore, the joining form of the present invention is completely different than US '992.

The Office Action specifically cited element 31 in Figs. 19 and 20 of US '992. Element 31 merely represents grooves for the insertion of the studs. Element 31 extends in the longitudinal direction of the flange.

Element 31 of Figs. 19 and 20 of US '992 does not disclose or suggest the thickness of the flange of a split tee partially reduced across the entire width of the split tee at a region corresponding to the extended direction of the web of the split tee.

US '992 does not disclose or suggest the open space of the present invention, which is across the entire width of the flange of the split tee, to provide for the flange of the split tee to plasticize prior to the column and beam.

US '992 does not disclose or suggest the present invention.

Summary

It is therefore submitted that claims 8-9 and 14-20 are patentable over JP '469 and/or US '436 and/or US '482 and/or US '992 alone or in combination.

CONCLUSION

It is submitted that in view of the present amendment and the forgoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application, as amended, be allowed and passed for issue.

Respectfully submitted,

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